

## ASSIGNMENT 7

Textbook Assignment: "Prime Movers, Pumps, and Compressors," chapter 6, pages 6-16 through 6-53.

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| <p>7-1. What is the purpose of the volute type of centrifugal pump?</p> <ol style="list-style-type: none"><li>1. To increase the velocity of the fluid</li><li>2. To allow liquid to enter the eye from more than one direction</li><li>3. To change the direction of the impeller discharge</li><li>4. To increase the pressure of the liquid</li></ol> <p>7-2. What part of a volute turbine type of centrifugal pump forces a change of direction of the impeller discharge?</p> <ol style="list-style-type: none"><li>1. Closed impeller</li><li>2. Open impeller</li><li>3. Multistage impeller</li><li>4. Diffuser vanes</li></ol> <p>7-3. To produce sufficient discharge pressure, a turbine well centrifugal pump uses a</p> <ol style="list-style-type: none"><li>1. single-stage impeller with volute</li><li>2. single-stage impeller with pressure jets</li><li>3. multistage impeller with volute</li><li>4. multistage impeller with pressure jets</li></ol> <p>7-4. For a domestic water supply, a centrifugal pump is used in shallow wells that do not exceed what depth?</p> <ol style="list-style-type: none"><li>1. 20 feet</li><li>2. 22 feet</li><li>3. 24 feet</li><li>4. 26 feet</li></ol> | <p>7-5. Even though not classified as such, vertical and horizontal centrifugal sump pumps are used as what type of pumps?</p> <ol style="list-style-type: none"><li>1. Sewage</li><li>2. Water</li><li>3. Steam</li><li>4. Fuel</li></ol> <p>7-6. Which of the following characteristics is a disadvantage of centrifugal pumps?</p> <ol style="list-style-type: none"><li>1. Complexity</li><li>2. Poor suction power</li><li>3. Heaviness</li><li>4. Limited adaptability</li></ol> <p>7-7. The suction lines and inlets of most centrifugal pumps are placed below the source level of the liquid being pumped for which of the following reasons?</p> <ol style="list-style-type: none"><li>1. To make priming easier</li><li>2. To reduce the need for priming</li><li>3. To reduce clogging</li><li>4. To reduce cavitation</li></ol> <p>7-8. The velocity of a liquid increases to the point where the pressure drop reaches the pressure of vaporization of the fluid. What is this phenomenon called?</p> <ol style="list-style-type: none"><li>1. Capitation</li><li>2. Cavitation</li><li>3. Vitiation</li><li>4. Decomposition</li></ol> |
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7-9. When cavitation occurs in extreme instances, what damage can the pump experience?

1. Severe cracking of the pump housing around bolts
2. Lock-up of the pump impeller
3. Disintegration of the pump bearings
4. Structural failure of the impeller blades

7-10. When the design of a pump causes cavitation, you can use which of the following methods to remedy the condition?

1. Increase suction lift with a foot valve
2. Install smaller piping
3. Decrease suction lift with a foot valve
4. Regulate the liquid demand

7-11. You close the discharge stop valve of a centrifugal pump and then start the pump. After the pump is at normal operating speed, you neglect to open the discharge stop valve. What happens as the pump builds up to its maximum discharge pressure?

1. The liquid begins to churn
2. The suction pressure overcomes the discharge pressure
3. The liquid passes to the discharge side of the pump
4. The heat is dissipated as the discharge pressure builds up

7-12. Packing is a general term that refers to

1. materials used to repair moving machinery
2. equipment used to seal leaks
3. materials used to seal water tanks
4. materials used to seal moving machinery joints

7-13. What material should you use to replace the packing on a pump?

1. Cork
2. All-purpose material
3. The product specified by the manufacturer
4. A combination of asbestos and babbitt

7-14. Uneven adjustment of the gland nuts on packing can cause what condition to occur on a pump?

1. Cracking of the suction flange
2. Scoring or grooving of the pump shaft
3. Overheating of the pump motor
4. Misalignment of the shaft between the pump and the motor

7-15. Which of the following materials do most water service pumps use for the seal faces in mechanical seals?

1. Babbitt
2. Brass
3. Wool felt
4. Carbon

7-16. By what means are mechanical seals positioned on the shaft?

1. Stub or step sleeves
2. Setscrews
3. Spring pressure
4. Seal gland or packing ring

7-17. Flexible couplings compensate for

1. excessive shaft slippage
2. slight misalignment
3. excessive misalignment
4. slight shaft slippage

7-18. When both the pump and the driving unit of a centrifugal pump need to be shifted sidewise or endwise for alignment, you should use what device?

1. Large setscrews
2. Wedges or shims
3. Jacking screws
4. Side brackets

7-19. Which of the following instruments should you use to check alignment of the shaft in a centrifugal pump?

1. A micrometer
2. A 12-inch scale
3. A dial indicator
4. An inside caliper

7-20. Which of the following is NOT one of the materials used for internal water-lubricated bearings?

1. Lignum vitae
2. Graphited bronze
3. High-lead content bronze
4. Low-lead content brass

7-21. On low-pressure pumps, the wearing rings need replacing when the wearing ring diametrical clearance exceeds the designed amount by .015 inch to .030 inch.

1. True
2. False

7-22. On high-pressure pumps, the wearing rings should be renewed when the clearance of the ring exceeds the manufacturer's plans by what percentage?

1. 100%
2. 90%
3. 80%
4. 70%

7-23. You must take a total of how many measurements of wearing rings with a micrometer to determine the wearing ring diametrical clearance?

1. One
2. Two
3. Three
4. Four

7-24. What factors are considered when replacing wearing rings?

1. Amount of work required to disassemble the pump
2. Downtime allowed by the command
3. Outside repair activity assistance
4. All of the above

FOR QUESTIONS 7-25 THROUGH 7-27, REFER TO TABLE 6-1 ON PAGES 6-25 AND 6-26.

7-25. When a centrifugal pump rotates in the wrong direction, which of the following symptoms is indicated?

1. It does not develop enough discharge pressure
2. It operates at a low capacity
3. It works a while then fails to deliver liquid
4. It does not deliver any liquid

7-26. Which of the following conditions can cause a motor-driven centrifugal pump to require too much power?

1. Misalignment
2. Lack of rigidity in the foundation
3. Low viscosity of the liquid being pumped
4. Too much heat in the liquid being pumped

7-27. A continual low pressure is found on a circulating pump. What is the most likely cause?

1. Blockage in the suction piping
2. Air or gas in the liquid being pumped
3. Clogged strainer
4. Cracked pump housing

7-28. When a pump fails to build up pressure after the discharge valve opens and the pump speed increases, you should take what action first?

1. Prime the pump
2. Open all valves on the pump suction line
3. Close the discharge valve
4. Secure the pump

7-29. Air-lift pumps are used for which of the following pumping applications?

1. Fuel-oil storage
2. Feedwater tanks
3. Wells
4. Chemical feeders

7-30. What does an air-lift pump use instead of a rotating mechanism to move liquid?

1. Centrifugal force
2. Water
3. Compressed air
4. Static pressure

7-31. When the air-water mixture of an air-lift pump reaches the top of the discharge pipe, how is the air separated from the water?

1. The mixture enters an air discharge tank that lets the air discharge naturally
2. The mixture strikes a deflector or separator which relieves the water from the air
3. The mixture is pumped into an open air tank and agitated
4. The mixture is funneled through a baffled pipe which separates the water from the air

7-32. The air-lift pump can deliver large quantities of water at

1. relatively low pressures
2. average household pressures
3. relatively high pressures
4. extremely high pressures

7-33. The capacity of an air-lift pump depends largely on what factor?

1. Length of time submerged in the well
2. Percent of air supplied to the pump
3. Length of time the pump is in operation
4. Percent of submergence of a foot piece

7-34. What condition tends to be accelerated by the entrained oxygen in air-lifted water?

1. Water contamination
2. The life of the well casing
3. Corrosion of the pipes
4. Maintenance problems

7-35. What procedure should you follow when operating an air-lift pump?

1. Use as much compressed air as possible
2. Regulate the compressed air correctly
3. Change foot pieces monthly
4. Lubricate the regulator valve daily

7-36. Pumps that use rapid flow of a fluid to entrain another fluid and thereby move it from one place to another are called

1. centrifugal pumps
2. rotary pumps
3. air-lift pumps
4. jet pumps

7-37. The ejector type of jet pump uses which of the following substances to entrain the fluid being pumped?

1. Steam
2. Air
3. Water
4. Compressed gas

7-38. After receiving a new pump from supply, you should immediately check

1. to ensure there are no loose or missing parts
2. to ensure the unit has a preservative covering
3. the site where the pump is to be installed
4. the nameplate data against the bill of material

7-39. When placing a water pump, you should ensure it is installed in a dry spot that is in easy reach for inspection and maintenance and is located

1. midway between the source and the major water-using equipment
2. as far from the source as possible
3. as near as possible to the source
4. in the utility room

7-40. You are installing a pump unit on a concrete base. What inspection should you make before grouting around the base?

1. Ensure the pump is aligned and level
2. Ensure the pipes are connected to the pump
3. Ensure the bolts are tight
4. Ensure the foundation is level

7-41. Grout is a mixture of what types of materials?

1. Cement, sand, and 'water
2. Pumice, sand, and water
3. Gravel, cement, and water
4. Gravel, sand, and water

7-42. In checking for angular adjustment between the pump shaft and the drive shaft, you should insert a feeler or taper gauge at how many points to ensure all readings are the same?

1. One
2. Two
3. Three
4. Four

7-43. Pump assemblies are supplied by the manufacturer with pump and driver on the same baseplate or with just the pump on the baseplate with the driver separate.

1. True
2. False

7-44. You are installing a pump and driver that are separate. What part should you bolt down and align first?

1. The pump
2. The driver
3. The shaft couplings
4. The pump rotor

7-45. You should grout a baseplate in which of the following ways?

1. By placing grout around the foundation bolts only
2. By removing shims and leveling pieces before grouting
3. By grouting the complete baseplate, including the leveling pieces and shims
4. By grouting only the pump baseplate

7-46. After the grout has set and the foundation bolts have been tightened, the pump should be checked for

1. alignment of the discharge and suction piping
2. level of the pump
3. parallel and angular alignment
4. shaft coupling tightness

7-47. When expansion joints are used in the piping system, they should be located at what point?

1. Next to the pump to support connections
2. At the first branch from the discharge and suction piping to aid in support
3. Should not be used in the system
4. Beyond the pipe supports close to the pump but not next to it

7-48. Suction piping must be selected and sized properly to minimize

1. volume restrictions
2. pressure loss
3. overheating of the driver
4. corrosion of the pump impeller

7-49. What device should you use to prevent air pockets in the suction line of a centrifugal pump?

1. Pipe seals for all joints
2. Eccentric reducers in the suction line
3. Check valves in the suction line
4. Unions on the discharge line

7-50. What type of valve should you install on the suction line to avoid priming the pump every time it is started?

1. Foot
2. Gate
3. Check
4. Globe

7-51. The stuffing box uses liquid to flush and lubricate the packing. The quality of this liquid is not important.

1. True
2. False

7-52. The pressure of flushing or lubricating liquid is set at what pressure above the stuffing box maximum operating pressure?

1. 5 to 12 psi
2. 5 to 10 psi
3. 3 to 8 psi
4. 3 to 6 psi

7-53. You are able to pump which of the following types of waste with a pump that has double mechanical seals?

1. Solids
2. Sewage
3. Slurries
4. Each of the above

7-54. For average operating conditions, it is recommended that 1 ounce of grease be added to the bearings in a pump at what intervals?

1. 3 to 5 months
2. 4 to 5 months
3. 3 to 6 months
4. 4 to 6 months

7-55. What type of grease is recommended for bearing lubrication?

1. Mineral grease with soda-soap base
2. Grease from vegetable oil
3. Grease from animal oil
4. Each of the above

7-56. When air is compressed, its volume is reduced and its pressure is increased.

1. True
2. False

7-57. Most air compressors in the Navy are driven by what type of prime mover?

1. Turboprop
2. Steam turbine
3. Internal combustion engine
4. Electric motor

7-58. What principle is used in a reciprocating air compressor to replace the cam actions of valves in an internal combustion engine?

1. Equal pressure overcomes spring tension
2. Spring pressure overcomes differential pressure
3. Differential pressure overcomes spring pressure
4. Equal pressure overcomes differential pressure

7-59. What change must be made in the design of a multistage arrangement of compressors to obtain higher air pressure?

1. The second-stage cylinder must be smaller than the first
2. The first-stage cylinder must be smaller than the second
3. The first-stage cylinder must be smaller than the third
4. The third-stage cylinder must be smaller than the first

7-60. An air compressor unloading system serves what function?

1. To relieve the compressor prime mover of the compression load during starting
2. To remove vapor from the airstream
3. To relieve the air cylinders and heads of heat
4. To remove oil from the airstream

7-61. What is a function of the air intake filter on an air compressor?

1. To exclude moisture
2. To keep the intake air free of dust
3. To dry humid air
4. Each of the above

7-62. What part of an air compressor removes moisture and dirt from the compressed air before it reaches the storage tank?

1. The air intake filter
2. The air receiver
3. The filter receiver
4. The filter and moisture separator assembly

7-63. When an air compressor cannot be placed on level ground, what are the limits on out-of-level operation?

1. 5° lengthwise and 5° sidewise
2. 10° lengthwise and 10° sidewise
3. 15° lengthwise and 15° sidewise
4. 20° lengthwise and 20° sidewise

7-64. The first stage of the air cleaner rotates the intake air and separates a lot of the dust collected in the dust cup. What is the process called?

1. Centripetal precleaning
2. Centrifugal precleaning
3. First-stage cleaning
4. First-stage precleaning

7-65. Which of the following checks should you make while the compressor is working?

1. Turn on the cooling water to ensure circulation through the compressor
2. Drain condensate from the coolers
3. Inspect the safety valves
4. Check the pressure of the cooling water

7-66. Compressed air falls into what three categories?

1. Power, process, and control
2. Process, control, and operation
3. Control, power, and operation
4. Power, operation, and industrial

7-67. A low-pressure air compressor system can deliver air up to what maximum psig?

1. 100
2. 115
3. 125
4. 130



7-68. What type of pipe is used for air distribution on a medium-pressure system?

1. Galvanized
2. Copper
3. Ductile cast iron
4. Black steel

7-69. Air compressor piping should be pitched in the direction of flow at how many inches per 100 feet?

1. One
2. Two
3. Three
4. Four

7-70. What device is used to absorb sound made by the intake and output of a compressor?

1. Quieter
2. Silencer
3. Muffler
4. Filter

7-71. What device removes moisture from air lines that would otherwise condense in the lines?

1. Dryer
2. Trap
3. Separator
4. Receiver

7-72. Which of the following agents should you use to clean compressor intake filters, cylinders, and air passages?

1. Soapy water
2. Kerosene
3. Benzene
4. Hydraulic oil